

### **Remarks/Arguments**

Claims 1-8 were pending in the application. With this amendment, claims 1, 3, 5 and 6 have been amended and new claim 9 has been added. Claims 1-9 are therefore pending in the application.

Support for the amendments to claims 1, 3 and 6 can be found in the originally filed application, for example, at page 1, lines 10-13. Support for the amendment to claim 5 can be found in the originally filed application, for example, in claim 1. Support for new claim 9 can be found in originally filed application, for example, at page 3, lines 12-26. No new matter has been added.

Claims 5 and 8 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 3,554,792 ("Johnson"). Claims 1 and 4 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,743,275 ("Cobett"). Claims 1, 3 and 4 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,293,994 ("Field"). Claims 2 and 5-8 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Field and further in view of U.S. Patent No. 4,728,537 ("Allen"). Claims 1, 3 and 4 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,116,679 ("Pietsch '679"). Claims 1, 3 and 4 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,105,457 ("Pietsch '457"). Applicants respectfully submit that the pending claims are patentable over these cited references for at least the reasons set forth below.

#### **Response to Section 102(b) Rejection based on Johnson**

The Office rejects independent claim 5 as anticipated by Johnson. Specifically, the Office asserts that "Johnson teaches a binder comprising an alkali metal silicate and sodium carboxymethyl cellulose (abstract)." (Office Action, page 2). Further, the Office alleges that regarding claim 8, "the alkali metal is sodium," citing to col. 5, line 11 of Johnson. (Office Action, page 2).

Applicants submit that Johnson discloses a welding electrode and a coating therefore which coating contains about 10 – 15 parts by weight of a binder consisting of

an alkali metal silicate and about 0.5 parts by weight of sodium carboxymethyl cellulose. (See Johnson, abstract). Consequently, the amount of CMC in the binder is between and 3.33 and 5 wt% and the amount of alkali metal silicate in the binder is between 95 and 96.66 wt%. Contrary to the Office's assertions, Applicants submit that such a binder is not suitable for producing iron ore agglomerates, for example, as specified in the application at paragraphs 0023 and 0024. Rather, such a binder would lead to excessive clustering and severe deformation instead of controlled growth that is needed to produce an agglomerate.

Accordingly, because Johnson discloses a coating for a welding electrode and not a coating that is capable of producing iron ore, Johnson cannot anticipate claim 5. Moreover, claim 8, which is dependent on claim 5, is also not anticipated by Johnson for at least the same reasons that claim 5 is not anticipated by Johnson. Reconsideration and withdrawal of the rejection of claims 5 and 8 is respectfully requested.

#### **Response to Section 103(a) Rejection based on Cobett**

The Office rejects claims 1 and 4 as obvious over Cobett. Specifically, the Office asserts that Cobett discloses ferrous metal briquettes made from ferrous metal particles and that the briquettes include alkali metal silicate and other binders such as other silicates. (Office Action, page 3). Further, the Office asserts that the amount of binder is at most 10%, and concludes that where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists. (Office Action, page 3).

Applicants submit that Cobett discloses ferrous metal briquettes made from ferrous metal particles and an alkaline metal silicate as a compound that forms a gel and hardens the final product. The alkali metal may be sodium (Cobett, col. 2, lines 13-14). To the alkali metal silicate, a gelling accelerator can be added. Although the Office asserts that "[t]he amount of binder is at most 10%," Applicants are unable to ascertain where such disclosure is found in Cobett, and the Office's citation, i.e. "line 1," appears to be incomplete. Cobett indicates that its ferrous metal masses comprise a mixture of at least 80%, and preferably at least 90% by weight of ferrous metal with the balance

being an alkali metal silicate and other inorganic impurities. (See Cobett, col. 2, lines 1-3).

Notwithstanding, as indicated, for example, in Example 1 of Cobett, in the total amount of additives to the ferrous metal particles, the amount of sodium silicate solution is much higher than 0.0001 to 0.07 %, as recited in Applicants' claim 1. Specifically, Example 1 includes about 4 wt% of sodium silicate based on dry weight, which is much higher than Applicants' claimed upper limit of 0.07%. According to Example 1, the briquette was prepared by combining 90% by weight of ferrous metal particles with 10% by weight of a solution of aqueous sodium silicate containing 42% by weight solids. Example 1, however, also notes that acceptable solids contents of the aqueous sodium silicate solutions ranged from as low as about 20% to as high as 50%.

In any event, contrary to the Office's assertions, the claimed range of 0.0001 to 0.07 % is well below that disclosed in Cobett. Consequently, the claimed range does not overlap or lie inside the ranges disclosed in Cobett. Accordingly, a *prima facie* case of obviousness has not been established, and claims 1 and 4 are patentable over Cobett.

#### **Response to Section 103(a) Rejection based on Field**

The Office rejects claims 1, 3 and 4 as obvious over Field. The Office alleges that Field teaches making fired mineral pellets in which the pellets include alkali metal silicate in an amount of above 0.08%, as well as cellulosic polymers. The Office concludes that "a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties." (Office Action, page 4).

Applicants submit that Field relates to a process of making fired mineral pellets by mixing particulate mineral material with moisture and binder comprising substantially water-soluble organic polymer to form a moist pelletizable mix, peletizing the moist mix by a tumbling process to form green pellets and firing the green pellets. According to Field, the binder comprises alkali metal silicate and the amount which is used is defined

as "a dry weight amount which is either (a) above 0.13% based on moist mix or (b) above 0.08% based on moist mix and at least three times the dry weight of the substantially water soluble organic polymer." (Emphasis added). (See Field, col. 1, lines 59-65). Accordingly, the amount of sodium silicate disclosed is higher than the range of 0.0001 to 0.07% based on the total weight of dry iron ore agglomerate, as claimed by Applicants.

Apparently, based on the Office's rationale for its conclusion of *prima facie* obviousness, the Office recognizes that there is no overlap of Field's amount of alkali metal silicate and Applicants' alkali metal silicate. Instead, the Office reaches its conclusion of obviousness stating, "a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties." This assertion, however, is made without any evidence other than the Office's mere speculation as to what one of ordinary skill in the art would expect. As set forth in the M.P.E.P., "[t]he examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness." M.P.E.P. § 2142; see also, *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). Consequently, Applicants submit that the Office has not met its burden.

Notwithstanding, the disclosure of Field regarding its amount of alkali metal silicate teaches away from Applicants' invention. As noted above, rather than render Applicants' invention as recited in claim 1 obvious, Field's binder comprises alkali metal silicate and the amount which is used is defined as "a dry weight amount which is either (a) above 0.13% based on moist mix or (b) above 0.08% based on moist mix and at least three times the dry weight of the substantially water soluble organic polymer." Such disclosure clearly would not lead one of ordinary skill in the art to include amounts of 0.0001 to 0.07%.

Applicants' invention leads to iron ore agglomerates with increased cold compression strength, preheat strength, and dry crush strength relative to the use of conventional binder systems comprising the same binder. The specified amount of alkali metal silicate causes the agglomerates obtained with the process of the invention to

have a similar or only slightly higher degree of deformation than binder systems where alkali metal silicate is absent. In contrast, binder systems generally comprising a larger amount of alkali metal silicate exhibit a significant increase in the degree of deformation, which is undesirable. Consequently, contrary to the Office's assertion, by increasing the amount of alkali metal silicate, one of ordinary skill in the art would expect the degree of deformation to undesirably increase.

Accordingly, Applicants submit that independent claim 1 and claims 3 and 4, which depend from claim 1, are patentable over Field.

**Response to Section 103(a) Rejection based on Field and further in view of Allen**

The Office rejects claims 2 and 5-8 as obvious over Field and further in view of Allen. The Office acknowledges that Field does not disclose using carboxymethyl cellulose. To supply this missing feature, the Office turns to Allen for the alleged disclosure "that carboxymethyl cellulose is a type of cellulosic binder."

As a preliminary matter, claim 2 depends from claim 1, while claim 5 is independent and claim 8 depends from claim 5. Accordingly, for at least the reasons that claim 1 is patentable, as noted above, claim 2 is also patentable.

Moreover, Applicants submit that Field relates to a process of making fired mineral pellets as discussed above. Although cellulosic polymers are mentioned as substantially water soluble organic polymers, carboxymethyl cellulose is not disclosed. Rather, the preferred binders of Field are acrylamides. Allen discloses a process for producing mineral ore agglomerates, however, binders containing a silicate are not disclosed.

As discussed above, Field teaches away from Applicants' invention. Consequently, regardless of whether Allen discloses that carboxymethyl cellulose is a type of cellulosic binder, a *prima facie* case of obviousness has not been made, as Allen cannot make up for the deficiencies of Field. For example, Allen fails to disclose the addition of a silicate.

Furthermore, Applicants acknowledge that “[a] reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). However, the Office’s reliance on Allen merely for the disclosure that “carboxymethyl cellulose is a type of cellulosic binder,” ignores the caselaw on which the Office relies to support its rejection, i.e. “[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. (emphasis in original) M.P.E.P. § 2141.03 (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984)).

In this instance, the Office does not rely on a mere alternative or nonpreferred embodiment disclosed in Allen. Rather, the passage of Allen on which the Office relies clearly criticizes, discredits and otherwise discourages one of ordinary skill in the art from using cellulosic binders, such as carboxymethyl cellulose. As set forth in the M.P.E.P. § 2141.02(VI),

the prior art’s mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed . . . . *In re Fulton*, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004).

Consequently, where Allen does criticize, discredit, or otherwise discourage the use of cellulosic binders, Allen teaches away from the combination of Field and Allen to arrive at Applicants’ invention. Allen is replete with such criticism. According to Allen,

“[a] difficulty with powdered cellulosic binders such as carboxymethyl cellulose is that the irregular particle shape and size distribution is such that the powder does not flow freely. Instead the dry particles tend to clump together rather than flow over one another. As a result it is difficult to achieve uniform supply of the low dosages that are required. Another problem is that the amount of cellulosic binder that has to be used for adequate strength tends to be too high to be cost effective. Another problem with some cellulosic polymers is that they can reduce surface tension, and this appears to be undesirable in pellet formation.

In practice the use of cellulosic binders has not been widely adopted.

presumably because of these or other problems. At present therefore there is very little use of organic binders and bentonite is still very widely used, despite the long-recognised disadvantages and decreasing availability of suitable grades of bentonite and despite the long-established possibility of using organic binder. (emphasis added) (Allen, col. 1, line 66 – col. 3, line 17).

In addition, at col. 2, lines 64-65, Allen indicates that use of polymers based on cellulose, particularly those sold under the trade name Peridur, which was believed to be carboxymethyl cellulose, had an unsatisfactorily low spalling temperature.

Accordingly, Allen does not merely disclose that cellulosic binders are nonpreferred or alternative embodiments to its touted binders. Rather, Allen teaches away from the use of cellulosic binders, such as carboxymethyl cellulose, by describing many alleged problems with their use. The Office cannot simply ignore Allen's critical statements that teach away from Applicants' invention on the one hand, and on the other hand pick and choose only that portion of the disclosure it deems supports its rejection to the exclusion of the rest. Clearly, such a rejection fails to consider Allen "in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention."

For at least the above reasons, Applicants submit that a *prima facie* case of obviousness has not been made. Therefore, claims 2 and 5-8 are patentable over Field in combination with Allen.

#### **Response to Section 103(a) Rejections based on Pietsch '679 and Pietsch '457**

The Office rejects claims 1, 3 and 4 as obvious over Pietsch '679 and Pietsch '457. More specifically, the Office asserts that Pietsch '679 discloses making a briquette from directly reduced finely divided material with 5-15% binder. The binder allegedly comprises 15-20% sodium silicate, which allegedly translates to 0.01-0.3%. In addition, the Office asserts that Pietsch '457 discloses a briquette of agglomerated directly reduced metalized particles with a binder consisting of hydrated lime, sodium silicate and water. The binder composition allegedly is 5-15% and the sodium silicate is 15-45%, which allegedly translates to 0.01-0.07%.

Applicants submit that Pietsch '679 discloses a method of making a briquette from 85-95% finely divided metallized material mixed with 5-15% of a binder. The binder consists essentially of liquid sodium silicate, hydrated lime, powdered pitch and water. The amount of sodium silicate within the binder is 15-20%. Contrary to the Office's conclusion, however, Applicants submit that the amount of sodium silicate corresponds to about 0.75-3%, and not 0.01-0.3%, based on the weight of the briquette. This is determined based by multiplying the total amount of binder in the briquette, i.e. 5-15%, by the amount of sodium silicate within the binder, i.e. 15-20%, which equates to 0.75-3%. The Office's calculations, therefore, appear to be in error. Consequently, the amount of sodium silicate is thus clearly higher than in the presently claimed invention.

Further, Applicants submit that Pietsch '457 discloses a briquette consisting of 85-95 % agglomerated metallized particles and 5-15% of a binder consisting of hydrated lime, sodium silicate and water. The amount of sodium silicate within the binder is 15-45%. Again, contrary to the Office's conclusion, the amount of sodium silicate corresponds to about 0.75-7%, and not 0.01-0.07%, based on the weight of the briquette. This is determined based by multiplying the total amount of binder in the briquette, i.e. 5-15%, by the amount of sodium silicate within the binder, i.e. 15-45%, which equates to about 0.75-7%. The Office's calculations, therefore, appear to be in error. The amount of sodium silicate is thus clearly higher than in the presently claimed invention.

In view of the above, Applicants submit that the Office has failed to establish a *prima facie* case of obviousness, as the claimed ranges do not overlap or lie inside the ranges disclosed in either Pietsch '679 and/or Pietsch '457. Accordingly, claims 1, 3 and 4 are patentable over each of Pietsch '679 and Pietsch '457.

## **Conclusion**

In view of the amendments and arguments set forth above, Applicants submit that the pending application is in condition for allowance. Notice to this effect is earnestly solicited.

Respectfully submitted,



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